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NOVEMBER 1987

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FLORIDA STEEL'S EDWARD FLOM

ELECTRIC FURNACES: A RESURGENCE IN ARC MELTING

MICROALLOYING IN HIGH STRENGTH, LOW ALLOY STEELS

IRON AGE
METALS PRODUCER

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NOVEMBER Vol. 3, No. 11

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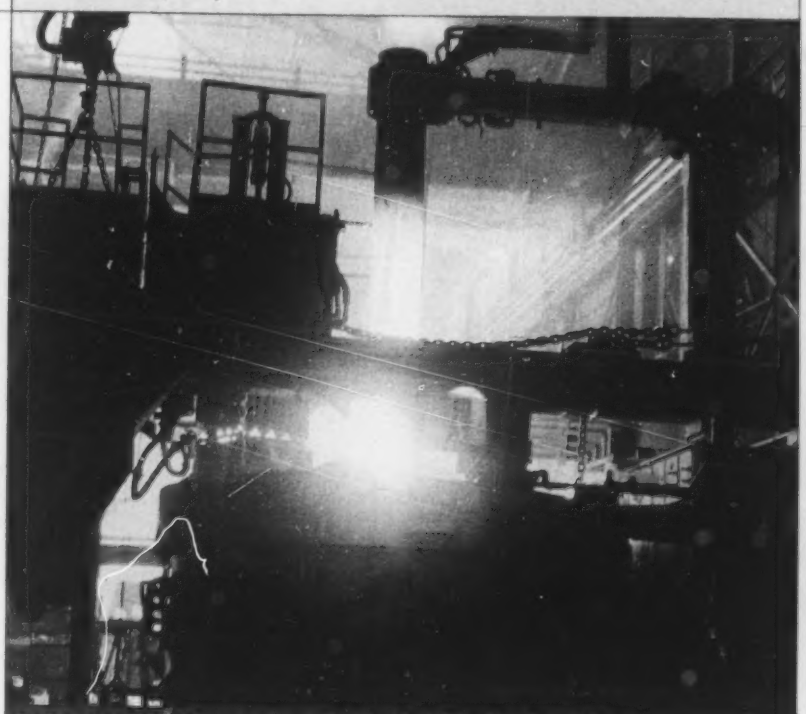

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INTEREST IN DRI STARTS TO HEAT UP AGAIN

A big purchase of Venezuelan briquettes by LTV Steel Co. is reviving hopes among suppliers that the U.S. market will open up, particularly since ferrous scrap prices are climbing.

LTV Steel Co. recently received a boatload of direct reduced iron briquettes, an unusual purchase in a steel industry that has been relying on scrap metal for its electric furnaces.

Over the past 40 years or so, direct reduction has periodically seemed on the brink of a big breakthrough in the United States. There has been steady progress abroad, but each U.S. flurry has fizzled out as a result of low scrap prices, high natural gas prices, and the depressed condition of the steel industry.

The direct reduced iron (DRI) briquettes shipped to LTV were produced by the FIOR plant in Venezuela. They were purchased to supplement scrap in the furnace charge in electric furnaces at LTV's Cleveland works.

This shipment could be the forerunner of big things for direct reduction in the U.S. It isn't likely that new reduction plants will be built here, but the product of offshore plants could find widespread use.

"We are convinced there will be a greater need, particularly among the electric furnace people," said Marcus O. Davies, president of Midrex Corp. Quality considerations are forcing increased use of virgin iron, Mr. Davies indicated.

Midrex and its parent, Kobe Steel, Ltd., are betting heavily on a growing market for DRI. They are leasing the High Iron Briquette plant built by USX Corp. years ago at Puerto Ordaz in Venezuela. This will be converted into an 800,000-ton Midrex plant and operated on a merchant basis during the 11-year lease.

"We expect the plant to fill a need," said Mr. Davies. The need and the demand already exist, he said; what's missing is a supply. "There isn't a heck of a lot of it available."

According to Midrex, the 12.7 million tons of DRI produced in 1986 compared with nearly 24 million tons of capacity. However, most of the capacity is represented by captive plants, committed to steel operations. In addition, much of the capacity is in remote areas, too far from the U.S. for economical shipment.

This is the case for one of the only two merchant plants—the big Midrex unit of Sabah Gas Industries in Malaysia. Rated for no more than a million tons of DRI per year, the Malaysian plant produced around 600,000 tons in 1986. Half the output went to Asian countries and the rest to Europe.

The other merchant source has been the FIOR plant in Puerto Ordaz. This plant uses the fluid bed reduction process developed by Esso Research. The fine particles produced are compacted into stable briquettes.

In 1988, much of the output of the FIOR plant will be taken over by Sivensa (Siderurgica Venezolana S.A.), a private electric furnace company in Venezuela. FIOR's contracts with Bethlehem Steel Corp. will be honored.

In addition, Sivensa will eventually be shipping some DRI from a completely new 400,000-ton plant it is ordering from Midrex and Voest Alpine AG of Austria.

In the U.S., the one source of DRI has been Georgetown Steel Corp. Georgetown does offer reduced pellets for sale. "We'll sell to anybody, anytime," said John Rodgers, manager of the company's Midrex operation. He said a price of $130 per ton f.o.b. Georgetown had held sales down.

The price of the FIOR direct reduced iron was not available, but it was said to be as low as $100 per ton. The prices have been running higher since August.

By George J. McManus

Direct Reduced Iron Capacity Utilization, 1986
(Million Metric Tons)

	Tons	Pct
Actual production	12.68	53.7%
Capacity idled due to war	1.22	5.2%
Capacity idled due to market factors	2.66	11.3%
Unused capacity started up in 1986	1.68	7.1%
Operating capacity limited by market factors	1.07	4.5%
Operating capacity limited by technical problems	4.31	18.2%
Total	23.62	100.0%

Source: Midrex Corp.

Steel composite price to be revised

The Finished Steel Base Price in the composite prices section of the Materials Prices table on this page will be revised due to a lack of necessary information. The revision will require a revamping of the basic pricing formula.

STEEL PRODUCTION, COMPOSITE PRICES

(Effective October 5, 1987)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,827	1,787	65,278	62,750
Capability Utilization Rate	84.6	83.5	77.1	64.6

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 10/4/87)	26.002	24.804	24.804	24.951
Pig Iron** (Net ton= 2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy *** (Gross ton=2240 lbs.)	$ 107.83	$ 97.17	$ 92.83	$ 73.17
No. 2 bundles	$ 71.83	$ 65.50	$ 58.83	$ 50.50

Scrap Comparison (Gross Ton)				
No. 1 steel, Pittsburgh	$115.50	$105.50	$ 96.50	$ 76.50
No. 1 steel, Philadelphia	91.50	88.50	84.50	71.50
No. 1 steel, Chicago	116.50	97.50	97.50	71.50
No. 1 bundles, Detroit	133.50	118.50	105.50	72.50
Low Phos., Youngstown	118.50	100.50	100.50	72.50
No. 1 mach'y cast., Pgh	92.50	92.50	92.50	74.50
No. 1 mach'y cast., Phila	101.50	93.50	93.50	93.50
No. 1 mach'y cast., Chi.	118.50	108.50	108.50	101.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strip.
**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.
***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)	gross-ton 58.0*
Pellets (per iron unit natural)	gross-ton 59.4**
Pellets (per iron unit natural)	gross-ton 72.45-86.9***
Mesabi, regular-unscreened	gross-ton 32.53
Mesabi, non-bessemer	gross-ton 30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Interlake Steel Mining, 1/1/85 and Pickands Mather, 8/1/85, delivered from all vessel, upper Lake ports. ***72.45¢—Cleveland-Cliffs as of 12/30/86. 72.5¢—U.S. Steel as of 8/16/85. 86.9¢—Oglebay Norton 3/28/82, Hanna Mining 3/26/82.

NONFERROUS PRICES

(Effective October 5, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	83.00	80.00	10/5/87
Copper (C)	87.00	88.00	9/18/87
Lead	42.00	38.00	7/6/87
Magnesium Ingot	153.00	148.00	12/9/85
Nickel (LME)	246.00	245.00	10/5/87
Zinc	43.00	45.50	9/9/87

ALUMINUM: Avg. for last week & previous week. COPPER (Cathode): LEAD: common grade. MAGNESIUM: 99.8% pig delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Laredo, Texas	$2.00
Beryllium-aluminum: 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be	$152.00
Beryllium 97% powder 200	$196.00
Cadmium, ton lots	$1.50
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$12.50
Gold, per troy oz.	$456.50
Indium, per troy oz.	$9.95
Iridium, per troy oz.	$350.00
Magnesium sticks, 10,000 lbs.	$2.12
Mercury, per 76-lb., f.o.b. NY	$348.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.45
Palladium, per troy oz.	$133.00
Platinum, per troy oz.	$307.00
Rhodium, per troy oz.	$1,280.00
Silver ingots, per troy oz.	$7.60
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red	$9.53-9.85
Vanadium	$6.00
Zirconium sponge	$11.20-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER, based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

Sept. 28—302.00	Oct. 1—299.00
Sept. 29—301.00	Oct. 2—300.00
Sept. 30—298.00	

Scrap Prices
Brass Mill Scrap

(Cents per lb., over 20,000 lbs. add 1¢ per lb.)

	Solids	Turnings
Copper	66	61
Yellow brass	59½	58½
Red brass	60½	56½
Comm. bronze	62	57
Mang. bronze	46	45
Free cutting rod ends	56½	55½

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	64
No. 2 copper wire	55
Light copper	49

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	59
No. 2 copper wire	51
Light copper	44
No. 1 composition	49
No. 1 comp. turnings	49
Hvy. yellow brass solids	35
Hvy. yellow brass turnings	29
Radiators	32

Aluminum		
New mixed clips	50	— 51
Old sheet	44	— 45
Old cast	44	— 45
Clean dry borings	44	— 45

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	44	— 45
Mixed I.C. clips	43	— 44
Old sheets and cast	37	— 38
Borings and turnings	32	— 33
Duraluminum clippings	37	— 38

Copper and Brass

No. 1 copper wire	53	— 57
No. 2 copper wire	45	— 46
Light copper	42	— 43
Radiators	30	— 31
No. 1 composition	43	— 44
No. 1 composition turnings	41	— 42
Cocks and faucets	37	— 38
Clean heavy yellow brass	34	— 35
Brass pipe	39	— 41
New soft brass clippings	50	— 51

Lead

Heavy soft lead	16	— 17
Whole batteries	2	— 3
Type metal	25	— 26
Electrotype	18	— 19

Nickel

Nickel solids	135	—145
Nickel rod ends	143	—153
Nickel sheets, clips	143	—153
Nickel turnings	31	— 41

Zinc

New zinc clippings	16	— 17
Old diecast zinc	12	— 13

EFFECTIVE OCTOBER 5, 1987

(Effective October 5, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of Iron Age editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 115.00 to	$ 116.00
No. 2 hvy. melting	97.00 to	98.00
No. 1 dealer bundles	159.00 to	160.00
No. 1 factory bundles (auto)	159.00 to	160.00
No. 2 bundles	64.00 to	65.00
No. 1 busheling	159.00 to	160.00
Machine shop turnings	13.00 to	14.00
Shoveling turnings	48.00 to	49.00
Cast iron borings	45.00 to	46.00
Low phos. punchings plate	154.00 to	155.00
Heavy turnings	97.00 to	98.00
No. 1 RR hvy. melting	121.00 to	122.00
Rails, 2 ft. and under	153.00 to	154.00
Scrap rails, random lgth.	124.00 to	125.00
RR specialties	152.00 to	153.00
No. 1 machinery cast	92.00 to	93.00
Cupola cast	84.00 to	85.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	625.00 to	635.00
18-8 turnings	525.00 to	535.00

Chicago

No. 1 hvy. melting	$ 116.00 to	$ 117.00
No. 2 hvy. melting	112.00 to	113.00
No. 1 dealer bundles	157.00 to	158.00
No. 1 factory bundles (auto)	153.00 to	154.00
No. 2 dealer bundles	88.00 to	89.00
No. 1 busheling	147.00 to	148.00
Shredder scrap	136.00 to	137.00
Machine shop turnings	39.00 to	40.00
Mixed borings and turnings	32.00 to	33.00
Shoveling turnings	49.00 to	50.00
Cast iron borings	54.00 to	55.00
Low phos. forge crop	149.00 to	150.00
Low phos. punchings, plate 1/4 in. and heavier	165.00 to	166.00
Low phos. 2 ft. and under	160.00 to	161.00
No. 1 RR hvy. melting	134.00 to	135.00
Scrap rails random lgth.	125.00 to	126.00
Rerailer rails	139.00 to	140.00
Rails, 2 ft. and under	159.00 to	160.00
RR couplers and knuckles	134.00 to	135.00
RR car axles	159.00 to	160.00
No. 1 machinery cast	18.00 to	19.00
Cupola cast	107.00 to	108.00
Stove plate	117.00 to	118.00
Steel car wheels	154.00 to	155.00
Stainless		
18-8 bundles and solids	600.00 to	610.00
18-8 turnings	460.00 to	470.00
430 bundles and solids	150.00 to	160.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 90.00 to	$ 93.00
No. 2 hvy. melting	80.00 to	83.00
No. 1 dealer bundles	35.00 to	38.00
No. 2 dealer bundles	61.00 to	64.00
No. 1 busheling	30.00 to	33.00
Shredder scrap	25.00 to	28.00
Machine shop turnings	26.00 to	29.00
Mixed borings and turnings	26.00 to	29.00
Shoveling turnings	44.00 to	47.00
Low phos. 5 ft. and under	20.00 to	23.00
Low phos. 2 ft. punchings	35.00 to	38.00
Electric furnace bundles	38.00 to	41.00
RR specialties	20.00 to	23.00
Rails, 2 ft. and under	34.00 to	37.00
Cupola cast	92.00 to	95.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	100.00 to	103.00

Detroit

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 89.00 to	$ 90.00
No. 2 hvy. melting	87.00 to	88.00
No. 1 dealer bundles	33.00 to	34.00
No. 2 bundles	67.00 to	68.00
No. 1 busheling	31.00 to	32.00
Drop forge flashings	91.00 to	92.00
Machine shop turnings	42.00 to	43.00
Mixed borings and turnings	15.00 to	16.00
Shoveling turnings	42.00 to	43.00
Cast iron borings	38.00 to	39.00
Heavy breakable cast	40.00 to	41.00
Mixed cupola cast	57.00 to	58.00
Automobile cast	79.00 to	80.00
Stainless		
18-8 bundles and solids	600.00 to	610.00
18-8 turnings	290.00 to	300.00
430 bundles and solids	150.00 to	160.00

Youngstown

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 101.00 to	$ 102.00
No. 2 hvy. melting	92.00 to	93.00
No. 1 dealer bundles	41.00 to	42.00
No. 2 dealer bundles	60.00 to	61.00
Machine shop turnings	26.00 to	27.00
Shoveling turnings	26.00 to	27.00
Low phos. plate	18.00 to	19.00
Electric furnace bundles	21.00 to	22.00
Galvanized bundles	18.00 to	19.00

Cleveland

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 96.00 to	$ 97.00
No. 2 hvy. melting	85.00 to	86.00
No. 1 dealer bundles	41.00 to	42.00
No. 1 factory bundles	136.00 to	137.00
No. 2 bundles	56.00 to	57.00
No. 1 busheling	135.00 to	136.00
Machine shop turnings	31.00 to	32.00
Shoveling turnings	31.00 to	32.00
Cast iron borings	31.00 to	32.00
Cut structural & plates, 5 ft. and under	14.00 to	15.00
Cut structural & plates, 2 ft. and under	137.00 to	138.00
Low phos. punchings plate	140.00 to	141.00
Foundry steel, 2 ft. & under	87.00 to	88.00
No. 1 RR hvy. melting	102.00 to	103.00
Rails, 2 ft. and under	134.00 to	135.00
Rails, 18 in. and under	136.00 to	137.00
No. 1 machinery cast	88.00 to	89.00
Mixed cast	55.00 to	56.00
Stainless		
18-8 bundles	605.00 to	615.00
18-8 turnings	295.00 to	305.00
430 bundles	155.00 to	165.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 84.00 to	$ 85.00
No. 2 hvy. melting	74.00 to	75.00
No. 1 busheling	29.00 to	30.00
No. 1 dealer bundles	29.00 to	30.00
No. 2 bundles	41.00 to	42.00
Machine shop turnings	18.00 to	19.00
Mixed borings and turnings	18.00 to	19.00
Shoveling turnings	24.00 to	25.00
Cast iron borings	29.00 to	30.00
Low phos. plate	15.00 to	16.00
Structural and plate 2 ft. and under	19.00 to	20.00
Rails, 2 ft. and under	29.00 to	30.00
Scrap rails, random lgth.	04.00 to	05.00
No. 1 machinery cast	89.00 to	90.00
No. 1 cupola cast	77.00 to	78.00

St. Louis

No. 1 hvy. melting	$ 109.00 to	$ 110.00
No. 2 hvy. melting	99.00 to	100.00
No. 1 busheling	35.00 to	36.00
No. 1 dealer bundles	39.00 to	40.00
No. 2 bundles	94.00 to	95.00
Machine shop turnings	24.00 to	25.00
Shoveling turnings	28.00 to	29.00
Cast iron borings	34.00 to	35.00
No. 1 RR hvy. melting	119.00 to	120.00
Rails, random length	18.00 to	19.00
Rails, 5 ft. and under	29.00 to	30.00
RR specialties	119.00 to	120.00
Cupola cast	79.00 to	80.00
Heavy breakable cast	43.00 to	44.00
Stove plate	107.00 to	108.00
Steel car wheels	139.00 to	140.00
Rerolling rails	130.00 to	131.00
Unstripped motor blocks	60.00 to	61.00

Birmingham

No. 1 hvy. melting	$ 104.00 to	$ 105.00
No. 2 hvy. melting	97.00 to	98.00
No. 1 dealer bundles	119.00 to	120.00
No. 2 bundles	79.00 to	80.00
No. 1 busheling	119.00 to	120.00
Shredder scrap	120.00 to	121.00
Machine shop turnings	49.00 to	50.00
Shoveling turnings	59.00 to	60.00
Cast iron borings	40.00 to	41.00
Electric furnace bundles	92.00 to	93.00
Elec. furnace, 3 ft. & under	94.00 to	95.00
Structural and plate, 2 ft.	124.00 to	125.00
Structural and plate, 4 ft.	119.00 to	120.00
No. 1 RR hvy. melting	119.00 to	120.00
Scrap rails, random lgth.	104.00 to	105.00
Rails, 2 ft. and under	124.00 to	125.00
Angles and splice bars	112.00 to	113.00
No. 1 cupola cast	92.00 to	93.00
Unstripped motor blocks	89.00 to	90.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 96.00 to	$ 97.00
No. 2 hvy. melting	86.00 to	87.00
No. 1 dealer bundles	138.00 to	139.00
No. 2 bundles	59.00 to	60.00
Machine shop turnings	27.00 to	28.00
Shoveling turnings	30.00 to	31.00
Cast iron borings	39.00 to	40.00
Low phos. 18 in. and under	139.00 to	140.00
Rails, random length	116.00 to	117.00
Rails, 2 ft. and under	144.00 to	145.00
No. 1 cupola cast	83.00 to	84.00
Heavy breakable cast	44.00 to	45.00
Drop broken cast	93.00 to	94.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 58.00 to	$ 60.00
No. 2 hvy. melting	51.00 to	52.00
No. 2 dealer bundles	35.00 to	37.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast, chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	15.00 to	17.00
Stainless		
18-8 prepared solids	500.00 to	520.00
18-8 turnings	365.00 to	385.00
430 prepared solids	100.00 to	110.00
430 solids	95.00 to	105.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	50.00 to	52.00
No. 1 dealer bundles	88.00 to	90.00
No. 2 bundles	30.00 to	32.00
No. 1 busheling	86.00 to	88.00
Shredder scrap	78.00 to	80.00
Machine shop turnings	2.00 to	4.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	75.00 to	80.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	54.00 to	56.00
No. 1 dealer bundles	51.00 to	53.00
No. 2 dealer bundles	40.00 to	41.00
Machine shop turnings	3.00 to	4.00
Cast iron borings	3.00 to	4.00
No. 1 cupola cast	79.00 to	81.00

Los Angeles

No. 1 hvy. melting	$ 61.00 to	$ 63.00
No. 2 hvy. melting	55.00 to	57.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 dealer bundles	39.00 to	40.00
Machine shop turnings	12.00 to	13.00
Shoveling turnings	13.00 to	14.00
Cast iron borings	13.00 to	14.00
Elec. furnace, 1 ft. and under (foundry)	70.00 to	72.00
No. 1 cupola cast	74.00 to	76.00

Seattle

No. 1 hvy. melting	$ 78.00 to	$ 79.00
No. 2 hvy. melting	68.00 to	69.00
No. 2 bundles	49.00 to	50.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 93.00
No. 2 hvy. melting, cut 2 ft. and under	80.00
No. 1 dealer bundles	116.00
No. 2 bundles	64.00
Mixed steel scrap	65.00
Bush. new fact. prep'd	111.00
Bush. new fact. unprep'd	94.00
Machine shop turnings	31.00
Short steel turnings	33.00
Mixed borings and turnings	20.00
Cast scrap	100.00

Houston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 94.00 to	$ 95.00
No. 2 hvy. melting	84.00 to	85.00
No. 2 bundles	52.00 to	53.00
Machine shop turnings	37.00 to	38.00
Crushed turnings	47.00 to	48.00
Shredder scrap	110.00 to	111.00
Cut structural plate, 2 ft. and under	109.00 to	110.00
Cut structural plate, 5 ft. and under	96.00 to	97.00
Unstripped motor blocks	63.00 to	64.00
Cupola cast	97.00 to	98.00